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ABSTRACT

Research indicates substantial evidence that, compared with competition, cooperation increases mutual friendliness and contact between individuals. The effects of cooperative and competitive experiences on the structure of student cliques in the classroom were examined. Seven classrooms of fourth-, fifth-, and sixth-grade students (N=117) were randomly assigned to cooperative group learning, competitive group learning, or control learning treatments for a six-week program. Following the program, student relationships were measured using two sociometric questions. Students also completed the State-Trait Anxiety Inventory for Children and the Social Behavior Scale. Results showed that cooperative groups decreased the average clique size, while competitive experiences enlarged pre-existing cliques. Both treatments increased mean student prestige, increased the tendencies of students to occupy broker network roles, and reduced isolate network roles. The results suggest that the increased opportunities for student interaction in the classroom provided by both group treatments increase relationships among individuals, but that cooperative and competitive goal structures have opposite effects on peer clique structures. (Author/NRB)

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Cooperation, Competition, and the Structure of Student Cliques

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Introductory Statement

The Center for Social Organization of Schools has two primary objectives: to develop a scientific knowledge of how schools affect their students, and to use this knowledge to develop better school practices and organization.

The Center works through five programs to achieve its objectives. The Studies in School Desegregation program applies the basic theories of social organization of schools to study the internal conditions of desegregated schools, the feasibility of alternative desegregation policies, and the interrelations of school desegregation with other equity issues such as housing and job desegregation. The School Organization program is currently concerned with authority-control structures, task structures, reward systems, and peer group processes in schools. It has produced a large-scale study of the effects of open schools, has developed Student Team Learning Instructional processes for teaching various subjects in elementary and secondary schools, and has produced a computerized system for school-wide attendance monitoring. The School Process and Career Development program is studying transitions from high school to post secondary institutions and the role of schooling in the development of career plans and the actualization of labor market outcomes. The Studies in Delinquency and School Environments program is examining the interaction of school environments, school experiences, and individual characteristics in relation to in-school and later-life delinquency.

The Center also supports a Fellowships in Education Research program that provides opportunities for talented young researchers to conduct and publish significant research, and to encourage the participation of women and minorities in research on education.

This report, prepared by the School Organization program, examines how cooperative and competitive classroom experiences affect the structure of student cliques.

Abstract

There is substantial evidence that compared with competition, cooperation increases mutual friendliness and contact between individuals. This study investigates the effects of cooperative and competitive experiences on the structure of student cliques in the classroom. The sample was 117 fourth, fifth and sixth graders in seven classrooms. Classes were randomly assigned to cooperative group learning, competitive group learning or control learning treatments for a six week program. Results supported the hypothesis that cooperative groups would decrease average clique size while competitive experience would enlarge pre-existing cliques. Both treatments increased mean student prestige, increased the tendencies of students to occupy broker network roles and reduced isolate network roles. These results suggest that the increased opportunities for student interaction in the classroom provided by both group treatments increased relationships among individuals, but that cooperative and competitive goal structures had opposite effects on peer clique structures.

Ever since Deutsch's (1949a, 1949b) classic work, the effects of cooperation and competition on peer relationships in educational settings have been important topics of study. There is substantial evidence supporting Deutsch's (1949a) hypothesis that cooperative social interaction, compared with competitive interaction, promotes increased friendliness, mutual concern and interpersonal attentiveness among individuals (Johnson and Johnson, 1975; Pepitone, 1980). In addition, cooperative classroom interventions based on this theoretical perspective have been shown to increase friendships between students of different cultural and racial backgrounds compared with traditional classrooms (Slavin, 1979; Wiegel, Wiser and Cook, 1975). Despite the extensive research in this area, however, no studies have explicitly investigated the effects of cooperation and competition on the structure of peer groups. Existing research has focused on simple sociometric indices of popularity or friendliness between individual students, and it is not known how cooperative and competitive experiences affect naturally-existing peer cliques in classrooms.

This issue has important implications for intergroup relations in schools because peer cliques are relatively segregated and exclusive. They tend to consist of students of similar sex, race or ethnicity, and age (Coleman, 1961; Glidewell, Kantor, Smith and Stringer, 1966; Gronlund, 1959; Hansell, 1981; Schofield, 1978). Because there are relatively few contacts between naturally existing peer cliques, the probabilities of intergroup communication and cooperation are structurally limited. An important issue for research is whether the beneficial effects of cooperation on individual peer friendships provide new contacts between formerly isolated cliques, and change clique structures in ways that would improve

intergroup relations. A parallel issue is the effects competitive interaction has on peer clique structures, and what the implications of competition are for intergroup relations in schools.

Deutsch's (1949a) theory does not explicitly discuss the structure of peer groups, but hypotheses about clique structures under cooperative and competitive conditions can be derived from two recent sources. First, Granovetter's (1973) discussion of strong and weak ties helps conceptualize the linkage between individual relationships and clique structures. Strong relationship ties take more time, involve more emotional intensity and intimacy, and are based on more reciprocal communication and exchanges of rewards than weak ties. Contacts within peer cliques tend to be strong ties, while contacts between cliques, called bridges, tend to be weak ties. The distribution of strong and weak ties in a network has implications for cohesion within and between peer groups. In a network with a high proportion of strong ties, within-group cohesion will be high, but there will be few opportunities for bridges between cliques, resulting in relatively high intergroup isolation and fragmentation. A network with a preponderance of weak ties will result in less internally cohesive, but more highly interconnected group structures.

Compared with competition, cooperation is known to increase reciprocated friendliness between individuals (Deutsch, 1949b; Lott and Lott, 1965) and the frequency of strong relationship ties (Hansell and Slavin, 1981). Assuming that cooperative and competitive classrooms are of equal size, and that students make the same number of sociometric choices across classrooms, several hypotheses about the effects of cooperative and competitive interaction on student cliques can be derived from Granovetter's (1973) theory. Because peer relationships are based on

relatively many reciprocated and strong ties in cooperative classrooms, there should be a pronounced tendency for students' friends to be friends, and substantial overlap in individuals' sets of friends. This is expected to result in relatively small, numerous and cohesive cliques. By contrast, peer relationships in competitive classrooms are based on relatively fewer strong ties. This implies that there will be less overlap in individuals' sets of friends, and consequently more different individuals will be interconnected by a given number of sociometric choices than in cooperative classrooms. This is expected to result in fewer, relatively large, and less cohesive cliques.

Another key assumption underlying these hypotheses is that the opportunities for student interaction are equal in cooperative and competitive classrooms. Hallinan has done a series of studies (1976, 1979, 1980; Hallinan and Tuma, 1978) of the effects of open and traditional classroom organization on relationships and clique structures. In open, compared with traditional classrooms, students are allowed to interact freely and extensively. They learn more about each other as individuals and are more likely to form friendships based on specific abilities and interests that cut across the status characteristics of sex, race or ethnicity, age and achievement. As a consequence, Hallinan hypothesized that cliques in open classrooms would be smaller and more numerous than cliques in traditional classrooms. Despite trends supporting these hypotheses, Hallinan (1979, 1980) reported no significant differences in the number and size of cliques in open and traditional classrooms, although the distribution of friendship choices was less hierarchical in open classrooms (Hallinan, 1976).

These results suggest that the opportunity for interaction in a classroom may affect the formation of dyadic relationships and the distri-

bution of status within cliques, but may not, by itself, have strong effects on clique structures. Increased opportunities for interaction may need to be combined with changes in the goal structure of the classroom to result in changes in peer group structure.

The present study investigated the effects of cooperative, competitive, and traditional classroom organization on the structure of peer cliques in a sample of elementary school classrooms. Two experimental treatments brought heterogeneous students together in small groups, and gave them extensive opportunities to interact and form new relationships. One treatment had a cooperative goal structure while the other had a competitive goal structure. In traditional classrooms, which served as controls, students did not interact in groups and were not provided with any opportunities for increased interaction, and experienced a competitive reward structure. Compared with student cliques in control classrooms, cliques in cooperative classrooms were expected to become smaller and more numerous, while cliques in the competitive classrooms were expected to become larger and less numerous.

A secondary purpose of this research was to investigate changes in the social roles of individual students resulting from the cooperative and competitive treatments. These roles were defined in terms of the patterns of sociometric choices to and from each student, and included prestige and choice status (Lin, 1976), and isolate, primary, follower and broker roles (Burt, 1976).[1] Treatment effects on social roles were assessed, controlling for class size, student ethnicity, sex, age, socioeconomic status (SES), and the personality characteristics of cooperativeness and trait anxiety. Controlling for classroom size and

student characteristics, both cooperative group and competitive group treatments were expected to increase relationships among heterogeneous students. As a consequence, both treatments were expected to increase average student reachability (Mitchell, 1969) and shorten the chains of relationship links, or path distances (Harary, Norman and Cartwright, 1965) among students. Prestige, and primary, follower and broker roles are positive functions of reachability and negatively associated with path distances, and were expected to increase as a result of both experimental treatments compared with control classrooms. In contrast, the isolate role is a negative function of reachability and a positive function of path distances, and was expected to decrease under both treatments.

Method

Sample and Design

The sample consisted of 117 fourth, fifth and sixth graders in two Catholic schools in the Washington, D.C. area. Five teachers administered the treatments to a total of seven classes; one taught a control and a cooperative class, one taught a cooperative and a competitive class, and three teachers taught only a cooperative, competitive or control classroom. Treatments were randomly assigned to teachers within schools. There were cooperative, competitive and control classes at each grade level except fourth grade, which had a cooperative class only. Overall, the sample had 57% Anglo Americans and 43% Hispanic Americans; 54% were boys and 46% were girls. There were 47 students in cooperative classrooms, 34 in competitive classrooms and 34 in control classrooms.

All classes studied a six week mathematics unit for one hour per day, five days per week, and followed a regular weekly schedule of instructional activities. This schedule involved a 2 1/2 period cycle, composed of

about 1 hour of teacher presentation, 1 hour of worksheet work, and a 30 minute quiz. This cycle was usually repeated twice each week. All classes received the same instruction, worksheets and quizzes. The treatments differed only in activities during the student worksheet periods and in the use made of student quiz scores (see below).

Steps were taken to minimize the influence of teachers' and students' expectations about experimental outcomes. Teachers and students were told that student relations were among several dependent variables being measured, and were not aware that these data would be used to analyze clique structures. Students and teachers were also informed that the experiment compared three interesting instructional methods rather than cooperative, competitive and control treatments.

Treatments

Experimental Cooperative Groups. The cooperative experimental treatment was Student Teams-Achievement Divisions (Slavin, 1978). Students were assigned to 4-5 member learning groups. Each group represented a cross-section of the class, containing a mix of high, average, and low performing students; boys and girls, and Hispanics and Anglos. The group assignments were made without reference to any pre-existing friendships. As part of this design, groups met for two periods each week to help one another study for the twice-weekly quizzes. During this time, students in each team sat in a circle and were encouraged to tutor one another, to quiz one another on worksheet items, and to generally help each other learn the academic material.

Following these group practice sessions, the students were individually quizzed. The quiz scores were summed to form a group score after transformation by a system that compared students' scores with their own past

performance. Students who improved their scores by a given percentage earned the same maximum points for their group. This system provided students of all ability levels with an approximately equal and substantial chance of contributing a maximum number of points to the group score (Slavin, 1980). Each week, teachers compared the scores earned by the members of each group and the membership rosters of all groups achieving a target score were posted on a bulletin board in the classroom.

This treatment was thus composed of an interdependent task structure and a cooperative reward structure within the teams. The cooperative contact between students allowed them to learn about each other as individuals. Group members were equal in status within the groups in terms of their potential contributions to group achievement scores. Finally, teacher involvement in setting up the cooperative groups could be seen as contributing to a normative climate in which cooperative interaction was encouraged.

Experimental: Competitive Groups. The competitive treatment was designed to stimulate within-group competition. Students in this treatment followed the same schedule of instruction, studied the same worksheets, and took the same quizzes as students in cooperative groups. As in the cooperative groups, their quiz scores were transformed into individual improvement scores. They also worked together on worksheets for two periods per week in small groups seated in a circle. This treatment was identical to the cooperative group treatment except in two ways. First, although students were allowed to interact freely in their small groups, they were not encouraged to help one another on their worksheets. Second, only the single student within each group with the highest improvement score was recognized by having his or her name posted on the bulletin

board each week.

This treatment was thus composed of an interdependent task structure and a competitive goal structure within the groups. The competitive group interaction among students allowed them to learn about each other as individuals and form new relationships. Group members were equal in status within the groups in terms of their potential for earning the highest improvement score. However, only one student in each group was rewarded. Finally, teacher involvement in setting up the competitive groups could be seen as contributing to a normative climate in which competitive interaction was encouraged.

Control. In the two control classes, students followed the same schedule of instruction, studied the same worksheets, and took the same quizzes as students in the experimental treatments. However, control students were not assigned to groups. They worked individually and had their quizzes returned with the number correct marked on them. The five highest scoring students in control classrooms were rewarded by having their names posted on the bulletin board each week. The control treatment thus had the independent task structure and competitive reward structure typical of traditional classrooms, and did not allow student interaction in small groups.

Measures

Student relationships were measured with two sociometric questions, "Who are your best friends in this class? Name as many as you wish," and "Who are the students you want in your math group next year? Name as many as you wish." For each sociometric question, students were

provided with enough space to name all others in the class, and were asked to write both the first and last names of their choices. Student sex, ethnicity and age were assessed by questionnaire items. Sex was coded 0 for males and 1 for females; ethnicity was coded 0 for Hispanics and 1 for Anglos; and age was coded 1 through 3 for ages 9 through 11, respectively. Students were asked to list their parents' occupations, which were classified according to Duncan's (1961) index of socioeconomic status (SES). These scores were trichotomized, and low to high SES was coded 1 through 3, respectively.

Spielberger has developed a measure of trait anxiety which has been shown to be negatively associated with sociometric popularity (Gaudry and Spielberger, 1971). In this study, the State-Trait Anxiety Inventory for Children was used. There were 20 items describing enduring tendencies to feel tense and nervous. Responses were coded 3 for often, 2 for sometimes and 1 for hardly ever. Item scores were summed to get a total anxiety score, with higher scores indicating greater trait anxiety.

The Social Behavior Sclae devised by Knight and Kagan (1977) was used to assess students' predispositions toward cooperativeness and competitiveness. Students were presented with a card showing four combinations of rewards. Each student was rewarded with three lifesavers and was asked how many he or she would want the experimenter to reward to an imaginary peer. Possible responses ranged from 1, indicating competitiveness, to 4, indicating cooperativeness.

Analysis

Identification of Student Cliques

The first task in the analysis is the identification of student cliques from the sociometric data.[2] This study used the network analysis program STRUCTURE, developed by Burt and his associates (Project, 1977). Euclidean social distances between each pair of students were calculated from the sociometric choice matrix, and then a cluster analysis was performed using Johnson's (1967) connectedness algorithm. This method is part of a growing tradition of "positional network analysis" (Burt, 1978) and has the advantage of avoiding the potential distortion caused by constrained row marginals in the free-choice sociomatrix (Breiger, Boorman and Arabie, 1974). The method yields cliques of students who are "structurally equivalent" (Lorraine and White, 1971), who have similar relations with all others in the network.

An issue in clique detection which has received little systematic attention is how to pick the cluster solution that best represents actual clique structures. This issue is important in the present study because of the comparisons of clique structures across classrooms. The method adopted here was to select the cluster solution at the median cluster value for each classroom.[3]

Indices of Network Roles

The prestige of students in their classrooms was calculated to take into account both the extent to which they had a large following (influence domain) and were centrally located in the group (centrality). Prestige was defined as the influence domain divided by the product of centrality and the total size of the classroom minus one (Lin, 1976). Prestige was therefore a function of the number of students in the classroom, the number of students directly or indirectly choosing the target person and

the average length of the choosing paths. Prestige scores varied between 0 and 1, with higher scores indicating higher prestige.

Choice status was the percentage of students in the classroom who named the target student as a friend. This index varied from 0 to 1 with higher scores indicating higher choice status, and thus was adjusted for class size.

As defined by Burt (1976), students who occupy an isolate role receive no choices from students in other roles, and make choices only to other students who also occupy isolate roles, as shown in Figure 1. The index varies between 0 and 1 with higher scores indicating more of a tendency to occupy an isolate role.[4]

Figure 1 About Here

A primary role consists of individuals who make most of their choices to others who also occupy primary roles, and who receive a nonnegligible proportion of the total choices made in the network (Burt, 1976). Individuals in primary roles tend to have the highest prestige in the network and are usually perceived as leaders. This index varies between 0 and 1, with higher scores indicating more of a primary tendency.

Occupants of the follower role name prestigious individuals in primary positions but do not have their choices reciprocated, and receive a negligible proportion of total choices in the network (Burt, 1976). This index varies from 0 to 1, with higher scores indicating more of a follower tendency.

Finally, the broker, like the follower, makes unreciprocated choices to individuals in primary roles, but unlike the follower, also receives a nonnegligible proportion of the total sociometric choices in the network (Burt, 1976).

Treatment Effects on Clique Structures

The results did not support the hypothesis that the cooperative treatment would increase the number of cliques and that the competitive treatment would decrease the number of cliques. As shown in Table 1, there were nonsignificant trends in the predicted directions for both friendship and math group sociometric criteria, but the trends were not strong enough to attain significance given the small number of cliques identified in this sample.

Table 1 About Here

However, the results supported the hypothesis that the cooperative treatment would decrease mean clique size and the competitive treatment would increase mean clique size. On the pretest, there were no significant differences in mean clique sizes in cooperative, competitive and control classrooms. On the posttest, friendship cliques in the cooperative classrooms were significantly smaller ($\underline{M}$ = 3.00) than those in the competitive classrooms ($\underline{M}$ = 5.75), $\underline{t}$ (15) = 2.08, $\underline{p} < .05$, although the changes from pretest to posttest within treatments were not large enough to be significant. Mean clique sizes for the cooperative and competitive classrooms were not significantly different from mean clique size in the control group, but did show the expected pattern. Cliques in control classrooms were smaller than cliques in competitive classrooms and larger than cliques in cooperative classrooms.[5]

A similar pattern of results occurred using the math group criterion of sociometric choice. On the pretest there were no significant differences in mean clique sizes in cooperative, competitive and control classrooms. On the posttest, mean clique size in cooperative classrooms

($\underline{M}$ = 2.73) was significantly smaller than mean clique size in the competitive classrooms ($\underline{M}$ = 4.17), $\underline{t}$ (19) = 2.04, $p < .05$. For math group choices, mean clique size in the competitive classrooms was also significantly larger than mean clique size in the control classrooms, $\underline{t}$ (13) = 1.88, $p < .05$. There were no significant changes from pretest to posttest within treatment groups.

Treatment Effects on Student Network Roles

The effects of the treatment on student network roles were assessed in multiple regressions. For example, the total friendship choices made on the posttest were regressed on two dummy variables representing the treatment, and the control variables of total friendship choices made on the pretest, classroom size, and student sex, ethnicity, age, SES, cooperativeness and trait anxiety. One dummy variable (TREATA) was coded 1 for the cooperative treatment and 0 otherwise. The other dummy variable (TREATB) was coded 1 for the competitive treatment and 0 otherwise. The control treatment was the reference category. This regression therefore assessed the change from pretest to posttest in sociometric choices caused by each experimental treatment, controlling for pre-existing choices and differing opportunities to make choices in classrooms of different size. Similar regressions were run for each index of network roles, and separate regressions were run for roles based on friendship and math group sociometric choices.

The analyses of network roles are shown in Table 2 and provided some support for the hypotheses. In terms of friendship, both cooperative and competitive interventions caused significant increases in average student prestige compared with controls. However, the cooperative treatment did not significantly affect other indices of network roles. In competitive classrooms, there was also a significant decrease in the tendency to occupy isolate roles, and a significant increase in broker roles. Although neither

treatment affected choice status, primary roles or follower roles, all of the significant effects were in the predicted directions in terms of both sociometric criteria. These treatment effects were obtained controlling for the student characteristics of ethnicity, sex, age, SES, cooperativeness, trait anxiety, and classroom size. These treatment effects were also not due to general increases or decreases in choice activity because neither treatment caused changes in total friendship choices made or received.

Table 2 About Here

The regressions of network roles based on math group sociometric choices on treatment variables and student characteristics are also shown in Table 2. The treatment effects on these indices were somewhat different from those on the friendship indices. The cooperative treatment had no effects on any type of network role. Also, the competitive treatment increased total choices received, although there was no significant increase in total choices made. Finally, in competitive compared with control classrooms, students had higher average choice status, a greater tendency to occupy broker roles, and were less likely to occupy isolate roles. There were also nonsignificnat trends for increases in prestige and follower roles. Again, these results were obtained controlling for student status and personality characteristics, and classroom size.[6]

Discussion

The results of this study supported the hypothesis that experience in cooperative groups would decrease average clique size, while competitive group experience would increase average clique size, both in terms of friendship and math group sociometric criteria. Although the parallel hypothesis that the cooperative treatment would create more cliques and that the competitive treatment would reduce the number of cliques was not

supported, there was a nonsignificant trend in that direction. Taken together, these results suggest that effects of cooperative and competitive classroom interaction on individual peer relationships also result in corresponding changes in the structure of peer cliques.

The cooperative goal structure successfully broke existing cliques into smaller cliques, by encouraging new relationships between formerly unassociated students. As students became acquainted in cooperative groups, they probably discovered mutual interests that cross-cut status characteristics of sex, ethnicity, age and academic ability, and formed new strong ties, and small, cohesive cliques. By contrast, the competitive goal structure in the competitive treatment groups probably increased the importance of status differences as criteria for affiliation, and strengthened and enlarged pre-existing student cliques.

If this interpretation of these results is correct, it has important implications for educational equity. The criteria for membership in student cliques are usually sex, race or ethnicity, age and academic achievement. The present results suggest that cooperative goal structures may make criteria of clique membership based on specific interests, abilities, and personality characteristics more salient, and reduce the importance of ascribed status or academic achievement. Competitive experiences probably reinforce the importance of status characteristics in the process of friendship and group formation. This would tend to strengthen the power and prestige of high achieving students at the expense of less advantaged, or minority, students (cf. Cohen, 1980). The small sample of students in the present study precluded a discriminant analysis to test this hypothesis directly, but it clearly is an important topic for further research.

The hypothesis that cooperative, as opposed to competitive, classrooms would change clique structures in ways that would improve intergroup relations between heterogeneous students could not be directly tested in this study. The Hispanic and Anglo students in this sample already had extensive interrelationships prior to the experiment. Their patterns of relationships were indistinguishable, and ethnicity did not appear to be a criterion for clique membership. The effects of cooperation and competition on the structure of intergroup relations needs to be tested in other schools in which race or ethnicity are more clearly bases for peer group affiliation.

The analysis of student network roles provided information about the cooperative and competitive treatments which leads to a more complex view of the costs and benefits of classroom organization than has previously been entertained. Although cooperation and competition had opposite effects on the size of cliques, both treatments increased the average friendship prestige of individual students, controlling for classroom size. Thus, both treatments increased student cohesiveness in these heterogeneous classrooms. The competitive treatment, especially, clearly increased the connectedness and cohesiveness of students. Students in the competitive classrooms were significantly less likely to occupy isolate roles and more likely to occupy broker roles than students in the control classrooms as a result of the treatment, in terms of both friendship and math group sociometric criteria. This may reflect the assimilation of individuals into hierarchical clique structures in the competitive classrooms, but it clearly indicates higher levels of social participation in both cooperative and competitive classrooms.

These results suggest that some of the effects of competitive interaction may be beneficial. It may well be argued that students should learn

to function in large, hierarchical, competitive social networks of the sort they will often encounter in adult life. If so, then competitive interaction within small groups in the classroom may provide important socialization experiences in assuming constructive roles in competitive social networks. Furthermore, there is some evidence that growth in social competence may be associated with varying involvements in network roles at different developmental stages (Hansell, 1981). It may be that cooperative goal structures encourage maximum social development during the preadolescent years when small, cohesive peer groups are important for identity and social support, while competitive goal structures encourage maximum student development during adolescence and young adulthood when developmental issues of interpersonal autonomy and worldly achievement become important.

An important aspect of the competitive treatment in this study was that it stimulated competition within small, face-to-face groups rather than between groups. The positive effects of competition on network roles found in this study, as opposed to the unbridled hostility which can result from intergroup competition (Sherif, et al., 1961), may depend on bringing peers together in a small group context in which they expect to have continuing face-to-face interaction. Thus competition, when stimulated under specific normative and social conditions, may have effects which are not simply good or bad. The results of this study suggest that the outcomes of competition and cooperation may depend more upon specific social settings for interaction than has previously been recognized. Investigating the specific circumstances under which varying outcomes occur is an important topic for further research.

In this research, both experimental treatments brought students together

in small groups in the classroom, and allowed them to interact freely and to form new relationships. By encouraging increased interaction among heterogeneous students, both treatments had effects which have been attributed to the open classroom (Hallinan, 1976). Interrelationships among heterogeneous students may be increased either by using open classroom organization or by setting up small work groups. However, the present results suggest that changes in clique structures may be more responsive to changes in cooperative or competitive goal structures rather than simple increases in the opportunities for student interaction. However, this study did not employ a full factorial design varying goal structures and group vs. individual learning experiences, which would be necessary to fully explore this hypothesis. This is an important area for further study.

Because this sample of classrooms was relatively small, the statistical tests of treatment effects on clique structures lacked power. The fact that even under this constraint the predicted effects of cooperation and competition on clique size were found in terms of both sociometric criteria suggests the potency of the experimental treatments. However, the sample was drawn from two Catholic schools, and the results may not be generalizable to other types of schools. These results need to be replicated and extended in larger, more representative samples of elementary school classrooms. However, as a first step toward exploring the effects of cooperation and competition on student clique structures, this study found evidence in support of the hypotheses in a particular school context.

Footnotes

1. We prefer the term "follower" to refer to Burt's (1976) "sycophant" role.
2. On the pretest, 121 students made an average of 6.22 friendship choices with a standard deviation of 3.43. They also made an average of 3.33 math group choices with a standard deviation of 1.66. These means are significantly different by t-test. Student characteristics did not influence friendship choices on the pretest, with the exception of trait anxiety. Highly anxious students received significantly more friendship choices, and made and received more math group choices than less anxious students. Class size was also significantly associated with choice activity. Students in larger classes made and received more choices than students in smaller classes. Finally, in this sample there were relatively few students who received no choices from others in terms of friendship (N = 3) or math group (N = 13) on the pretest. The treatments did not significantly change the number of students who received no choices, probably because of ceiling effects.
3. The median cluster solution was adopted as a compromise and is not crucial to the analysis. It has the major advantages of being a reliable criterion of clique boundaries, and one based on ranks, and therefore enables comparisons of cliques across classrooms of varying sizes. This method yielded cliques that were based primarily on sex. Within classrooms, age, ethnicity and academic achievement were not reliable criteria of clique membership. However, this could be due to the relatively small sample of cliques identified in this sample.

4. This use of term "isolate" is not to be confused with the term as it is usually used in the sociometric literature, which refers to students who receive no choices from others. As discussed by Burt (1976), "isolate" refers to individuals who occupy the same abstract role, defined in terms of choice densities to and from others. Thus, these "isolates" may have friends and be members of peer cliques. However, they tend to make choices only to other "isolates" and do not receive many choices from persons occupying primary, broker or follower roles.

5. It should be noted that the cooperative treatment included one fourth, one fifth and one sixth grade classroom, while the control and competitive treatments each included one fifth and one sixth grade classroom. It is unlikely that the slightly younger mean age of students in cooperative classrooms accounted for the treatment effects, because there were no significant treatment differences in the number or size of cliques on the pretest. In general, age did not influence any sociometric or clique indices in this study.

6. There were significant treatment by personality interaction affects on several of the indices of network roles. For example, when separate analyses were run for students with predispositions to be cooperative and competitive, the cooperative treatment had stronger effects on the roles of cooperative students than on competitive students' roles. The prestige and follower roles of cooperative students increased under the cooperative treatment but not under the competitive treatment, and neither treatment affected these role dimensions for competitive students. Similarly, a different pattern of results was found for students low and high on trait anxiety. The prestige and follower

roles of high anxiety students increased under both treatments, possibly indicating their increased social participation in both types of small groups. However, the primary roles of low anxiety students increased only under competitive group conditions suggesting their greater abilities to interact in competitive situations. Although these interactions are intriguing, the small subsample sizes upon which they are based limit our confidence in their reliability, and they should be regarded as tentative findings. Further research on the interaction effects of personality characteristics and goal structures on network roles needs to be done employing larger samples.

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Table 1

Mean Clique Size by Treatment on Pretest and Posttest

Treatment	Friendship Sociometric Criterion		Math Group Sociometric Criterion	
	Pretest	Posttest	Pretest	Posttest
Cooperative	3.89	3.00[a]	3.17	2.73[b]
	(2.09)	(1.00)	(1.80)	(1.10)
	(9)	(13)	(12)	(15)
Control	3.50	3.14	3.50	2.67[c]
	(1.38)	(1.46)	(1.76)	(1.19)
	(6)	(7)	(6)	(9)
Competitive	3.71	5.75[a]	3.71	4.17[b,c]
	(1.98)	(4.11)	(1.60)	(1.94)
	(7)	(4)	(7)	(6)

Note. The top number in each cell is the mean clique size, the middle number in parentheses is the standard deviation, and the bottom number in parentheses is the number of cliques identified.

[a,b,c] Means with the same superscript are significantly different by t-test, $p < .05$.

Table 2

Regressions of Posttest Network Roles on Treatments and Student Characteristics

Predictor	Friendship Sociometric Criterion								Math Sociometric Criterion							
	TOTM	TOTR	PRES	STAT	ISOL	PRIM	FOLL	BROK	TOTM	TOTR	PRES	STAT	ISOL	PRIM	FOLL	BROK
Cooperative Treatment	-.17	-.11	.25*	-.11	-.03	.01	.06	-.04	-.06	.09	-.12	.09	-.01	-.08	-.10	.03
Competitive Treatment	-.02	.05	.35*	.04	-.25*	.07	.14	.25*	.13	.20*	.18	.21*	-.46*	.13	.17	.53*
Ethnicity	-.11	.01	.02	.03	-.09	.12	-.11	.12	-.06	.02	.06	.01	-.03	.08	-.08	.00
Sex	.03	-.12	.19*	-.13*	.15*	.00	-.11	-.17*	.11	.02	-.04	.00	.02	.05	.06	-.05
Age	-.02	-.13	-.04	-.10	.02	.05	-.09	-.06	-.02	-.13	.09	-.12	.03	-.07	.11	-.01
SES	-.07	-.06	-.03	-.05	.01	-.03	.05	.00	-.03	.04	.10	.05	-.07	-.03	.10	.13
Cooperativeness	-.14	.06	.03	.05	-.10	.03	.05	.11	-.07	-.03	-.04	-.06	.01	-.02	.01	.00
Trait Anxiety	.12	.11	-.31*	.06	-.10	.13	-.14	.07	.04	.05	.07	.05	.14*	.06	-.27*	-.07
Pretest Choices[a]	.44*	.74*	.04	.81*	.66*	.70*	.46*	.61*	.24*	.77*	.35*	.78*	.66*	.63*	.33*	.57*
Class Size	.15	.07	.06	-.04	-.07	.02	-.01	.12	.33*	-.02	.18	-.06	.05	-.01	.24*	-.08
R^2	.40	.67	.22	.73	.55	.55	.30	.47	.29	.70	.29	.62	.58	.46	.34	.52

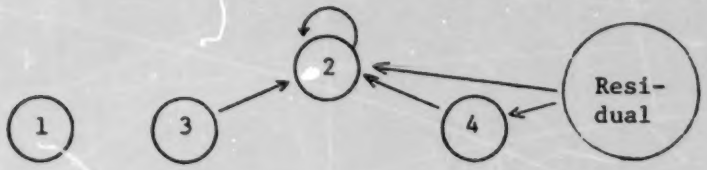
Note: N = 112. Standardized betas are shown. Variable symbols: total choices made (TOTM), total choices received (TOTR), prestige (PRES), choice status (STAT), isolate position (ISOL), primary position (PRIM), follower position (FOLL), broker position (BROK). TREATA is coded 1 for cooperative treatment, 0 for others, TREATB is coded 1 for competitive treatment, 0 for others. Other codes are explained in the text.

[a]The same kind of pretest role variable as the posttest dependent variable was used as a control variable in each regression.

*Unstandardized beta is greater than 1.96 times its standard error.

Figure 1

Representation of Network Roles
in Terms of Social Relations Among Them



Note. Isolate position is 1, primary position is 2, follower position is 3, and broker position is 4. The circular arrow over 2 indicates a strong tendency for individuals in the primary position to choose each other. The residual position consists of individuals not clearly classified in one of the other four positions. This figure is based on Burt's (1976) definitions.